ALGEBRA

C—4

29. If $x - \frac{1}{x} = 1$, then what is the value of $x^8 + \frac{1}{x^8}$?

(A) 3
(B) 119
(C) 47
(D) -1

SSC CGL 2021

$$x - \frac{1}{x} = 1$$

$$\Rightarrow x + \frac{1}{x} = \sqrt{1+4}$$

$$= \sqrt{5}$$

$$x^2 + \frac{1}{x^2} = 3$$

$$x^4 + \frac{1}{x^4} = 7$$

$$x^8 + \frac{1}{x^8} = 47$$

30. If $\frac{6x}{2x^2+5x-2} = 1$, $x > 0$ then the value of $x^3 + \frac{1}{x^3}$ *is*:

(A) $\frac{3}{8}\sqrt{17}$ (B) $\frac{5}{8}\sqrt{17}$

(C) $\frac{5}{16}\sqrt{17}$ (D) $\frac{3}{4}\sqrt{17}$

SSC CHSL 2019

$2x^2+5x-2 = 6x$

$\Rightarrow 2x^2 - x - 2 = 0$

$\Rightarrow 2x - 1 - \frac{2}{x} = 0$

$\Rightarrow 2x - \frac{2}{x} = 1$

$\Rightarrow 2\left(x - \frac{1}{x}\right) = 1$

$\Rightarrow \left(x - \frac{1}{x}\right) = \frac{1}{2}$

$\therefore x + \frac{1}{x}$

$= \sqrt{\left(\frac{1}{2}\right)^2 + 4}$

$= \sqrt{\frac{1}{4} + 4}$

$= \sqrt{17/4} = \frac{\sqrt{17}}{2}$

$\left(\frac{\sqrt{17}}{2}\right)^3 - \frac{3\sqrt{17}}{2}$

$= \frac{17\sqrt{17}}{8} - \frac{12\sqrt{17}}{8} = \frac{5\sqrt{17}}{8}$

31. If $x - \frac{1}{x} = 5, x \neq 0$, then what is the value of $\frac{x^6+3x^3-1}{x^6-8x^3-1} = ?$

(A) $\frac{4}{9}$

(B) $\frac{11}{13}$

(C) $\frac{3}{8}$

(D) $\frac{13}{12}$

SSC CGL 2020

$$x - \frac{1}{x} = 5$$

$$\frac{x^6+3x^3-1}{x^6-8x^3-1}$$

$$x^3 - \frac{1}{x^3} = (5)^3 + 3(5) = 125 + 15 = 140$$

$$= \frac{x^3 - \frac{1}{x^3} + 3}{x^3 - \frac{1}{x^3} - 8}$$

$$= \frac{143}{132} = \frac{13}{12}$$

32. If $x^4 - 6x^2 - 1 = 0$, *then the* value of $x^6 - 5x^2 + \frac{5}{x^2} - \frac{1}{x^6} + 5$

(A) 239 (B) 204

(C) 219 (D) 209

SSC CGL 2019

$x^4 - 6x^2 - 1 = 0$

$= x^2 - \frac{1}{x^2} = 6$

$x^6 - \frac{1}{x^6}$

$= (6)^3 + 18$

$= 216$

$\ 18$

$\ 234$

$x^6 - 5x^2 + \frac{5}{x^2} - \frac{1}{x^6} + 5$

$= x^6 - \frac{1}{x^6} - 5\left(x^2 - \frac{1}{x^2}\right) + 5$

$= 234 - 30 + 5$

$= 209$

$x - \frac{1}{x} = 3$

$x^3 - \frac{1}{x^3} = ?$

33. If $2a + \frac{1}{2a} = 6$, *then what is the* value of $64a^6 + \frac{1}{64a^6}$?

(A) 46656 (B) 39202

(C) 42592 (D) 36752

RRB NTPC 2021

$$2a + \frac{1}{2a} = 6$$

$$\Rightarrow 4a^2 + \frac{1}{4a^2} = 34$$

$$\therefore (4a^2)^3 + \left(\frac{1}{4a^2}\right)^3 = (34)^3 - 3 \times 34$$

$$= 39304 - 102$$

$$= 39202$$

$$= 64a^6 + \frac{1}{64a^6}$$

$$(4a^2)^3 + \left(\frac{1}{4a^2}\right)^3$$

34. If $4\chi^2 - 6x + 1 = 0$, *then the* value of $8\chi^3 + (8\chi^3)^{-1}$ is:

(A) 36
(B) 13
(C) 18
(D) 11

SSC CGL 2019

$$4x^2 - 6x + 1 = 0$$

$$\Rightarrow 4x + \frac{1}{x} = 6$$

$$\Rightarrow 2x + \frac{1}{2x} = 3$$

$$8x^3 + \frac{1}{8x^3}$$

$$= (2x)^3 + \left(\frac{1}{2x}\right)^3$$

$$= (3)^3 - 3 \times 3$$

$$= 18$$

35. If $\left(w+\frac{1}{w}\right)=6$ *then what will be* the value of $\left(w-\frac{1}{w}\right)$:

(A) $4\sqrt{2}$ ✓

(B) $\sqrt{2}$

(C) $3\sqrt{2}$

(D) $2\sqrt{2}$

SSC CHSL 2023

$w-\frac{1}{w}=\sqrt{6^2-4}$

$=\sqrt{32}=4\sqrt{2}$